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Concrete with very high compression strength - made using sand consisting of porous roasted clay

Concrete with high compression strength is obtd. by mixing fine gravel possessing a high compression strength, sand, cement and water, together with a porous ceramic sand such as roasted clay having a grain size of 0.1-5 mm. and pores of 0.5-15 μ dia. which are larger than the size of the cement grains used. One pref. cement is CPA 400 HTS used with a sand having pores 0.5-2 μ dia. where 65% of the pores are 1-1.5 μ dia. Alternatively, cement CPA 400 is used with sand having pores 1-15 μ dia. where 60% are 5-10 μ dia.; 'Ciment Fondu' (RTM) may also be used with sand having pores of 1-15 μ dia. where 60% are 5-10 μ. The roasted clays are pref. kaolinic or illitic clays, or marls. Artificial sand 0.1-5 mm. size may be used with porphyritic gravel, 5-18 mm. in size.

ADVANTAGE

Very high compression strength can be obtd. and the process is easily carried out on a construction site. Due to the strength, the size of concrete structures can be reduced.

DETAILS

The pores have a double role, (a) they act as an anchor for the hydrated cement crystals; (b) they provide reserves of water for delayed hydration of the anhydrous cement.

EXAMPLE

For 1 cubic metre of concrete, three lots of porphyritic gravel: 510 kg (13-18 mm. particles) 495 kg (8-12 mm. particles) and 275 kg (5-10 mm. particles) were mixed with 440 kg. artificial sand (0.5 mm.), 400 kg. cement CPA 400 HTS (RTM) (2990 cm^2/g.) and 220 litres water. After hardening 90 days at 20°C. this concrete had a compression strength of 857.5 bars whereas a conventional type of concrete only had a strength of 450 bars after 90 days. It is important to match the size of the pores in the artificial sand to the dia. of the grains of the cement used.(11 pp.).